HOLLIWELL BRIDGE
Iowa Bridges Recording Project
Spanning Middle River at county road
Winterset Vicinity
Madison County
Iowa

HAER No. IA-64

BLACK & WHITE PHOTOGRAPHS

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HISTORIC AMERICAN ENGINEERING RECORD
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HISTORIC AMERICAN ENGINEERING RECORD

HOLLIWELL BRIDGE

HAER No. IA-64

Location:	Spanning Middle River at unnamed county road; 2.0 miles southeast of Winterset; Madison County, Iowa UTM: 15.412430.4581990 USGS: Patterson, Iowa quadrangle (7.5 minute series, 1983)
Date of Construction:	1879-80
Designer/Contractor:	H.P. Jones and G.K. Foster, Winterset, Iowa
Present Owner:	Madison County , Iowa
Present Use:	Pedestrian bridge
Significance:	Madison County has the greatest number of covered wooden bridges surviving in Iowa. The technology of timber bridges predominated in Iowa until the widespread adoption of iron trusses in the 1870s. The Holliwell Bridge uses a Town lattice truss with a superimposed arch for added stiffness. The roof and siding, while giving a romantic appearance, were added to prevent deterioration of the timber structure. Among the Madison County bridges, the Holliwell Bridge is the longest span, and an excellent example of the covered timber bridge in Iowa.
Historian:	Leslie Pitner, August 1995
Project Information:	This document was prepared as a part of the Iowa Historic Bridges Recording Project performed during the summer of 1995 by the Historic American Engineering Record (HAER). The project was sponsored by the Iowa Department of Transportation (IDOT). Preliminary research was performed by Clayton B. Fraser of Fraserdesign, Loveland, Colorado.

INTRODUCTION

Madison County's covered bridges are easily the most famous bridges in Iowa. Celebrated in Robert James Waller's best-selling novel, The Bridges of Madison County, and its movie adaptation, the bridges have become emblems of romance and forbidden passion. Tourists from across the United States now make pilgrimages to see the bridges where Robert and Francesca, characters in the novel, met. Forgotten, however, is the transportation role and the technology of these bridges. The Holliwell Bridge, built in 1880, stands as an example of the Madison County bridges and their historical roles.
At six, Madison County has the largest number of remaining covered timber bridges of any county in Iowa. Nineteen covered bridges were erected in the county, most constructed according to standards established by the Madison County Board of Supervisors. In January of 1870, the Board of Supervisors adopted a series of rules governing construction of bridges in the county. The local paper, the Madisonian, commented: "Our Board of Supervisors has done well in adopting new rules to govern the erection of county bridges. There has been much complaint about the erection of county bridges, as to their stability and make."[1] The supervisors specified that timber lattice trusses be used for all bridges over 40' and that the bridges be covered. Instead of stone abutments, wooden trestles were to form the substructure. In addition, a special committee was formed to evaluate petitions and handle all other bridge matters.[2]

At the time the supervisors were standardizing bridge building in Madison County, the days of the timber bridge were drawing to a close. Production of wrought iron was increasing and iron truss bridges were beginning to appear in Iowa. Madison County would continue to build covered timber bridges until the mid-1880s, when many other counties in Iowa had already turned to iron bridges almost exclusively for bridges of these lengths. Why Madison County persisted in the construction of timber bridges is difficult to pinpoint. Topography, however, seems the most likely answer. Madison County lies in central Iowa, in an area of rolling hills and rivers, which is well timbered and has a minimum of prairie. The abundant local timber resources and saw

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[1]Madisonian, January 12, 1870, quoted in Mrs. Fred Hartsook, "Interesting History Behind Covered Bridges in Madison County," in Scenic Madison County, Iowa: Historical Significance (Winterset, Iowa: Madison County Historical Society, 1983), 20.

[2]Madison County Board of Supervisors' Minutes, January 7, 1870 (Book B, p. 79), at Madison County Courthouse, Winterset, Iowa.

mills made these timber bridges inexpensive and most likely contributed to the decision to continue to build large-scale wooden bridges.

THE TECHNOLOGY OF THE WOODEN TRUSS

The earliest bridges in the United States were simple pile and beam bridges which had serious limits on span or load capacity. The development of timber truss frames allowed for bridges of much greater strength and span, while still using relatively small wooden members. The trusses developed, however, were not based on mathematical calculations, but on the experience of the carpenter-builder.[3]

A number of timber truss types were developed in America during the first few decades of the nineteenth century. Timothy Palmer, Theodore Burr, and Lewis Wernwag all designed early timber trusses, often based on designs developed in the Renaissance. In 1820, Ithiel Town patented his lattice truss. It is constructed with horizontal upper and lower chords and mesh of intersecting diagonals. The diagonals could be made of quite light members and simply bolted into place, which made the truss easy to construct. The web of diagonals gave the truss great rigidity in the vertical plane, but were too flexible under lateral forces.[4] Many hundreds of bridges using the Town lattice were built for use as highway bridges in the nineteenth century.[5] The Town truss was then superseded by a succession of wood and iron truss designs, leading up to the Pratt and Warren trusses still in use today. The Madison County bridges, however, were constructed using the Town truss which was developed so early in the century.

COVERED BRIDGES IN MADISON COUNTY

In Madison County, the North, South, and Middle Rivers formed the most serious impediments to overland travel, but several smaller streams required substantial bridged crossings as well. To bridge the myriad of streams, the county board of supervisors ordered numerous short-span timber pile and kingpost structures

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[3]Carl W. Condit, American Building, (Chicago: The University of Chicago Press, 1968), 51-3.

[4]Condit, 56-8.

[5]Robert Fletcher and J.P. Snow, "A History of the Development of Wooden Bridges," Transactions of the American Society of Civil Engineers 58 (November 1932), reprinted in American Wooden Bridges, (New York: American Society of Civil Engineers, 1976), 52.

built in the 1850s and 1860s. Though inexpensive to erect, most of these spans tended to be structurally suspect and required frequent maintenance to prevent their collapse.

The Holliwell Bridge stands on the site of the first bridge built in Madison County, which was built in the winter of 1854 and 1855. This bridge was part of the mail route and a main pioneer highway. It was washed away in 1876, and the Holliwell Bridge was erected in 1880.[6] With a truss span of 110′ and approach spans of 49′ and 14′ roadway, it is the longest of the Madison County bridges. The bridge uses the Town lattice truss reinforced by a doubled flat arch, a configuration unique to the Holliwell Bridge in the work of Jones and Foster. The upper and lower chords are constructed of two 3 x 13 timbers which are bolted together. The lattice is made up of 2 x 12 timber diagonals. One arch is on each side of the lattice truss with the arches bolted together laterally at regular intervals. The arches are constructed from 6 x 14 timbers. The center top beams of the arch are 39′ long and curve from a height of nine feet up to thirteen feet. The end beams, or haunches, are 16′ long and arch up from the floor up to meet the center beam at nine feet high.[7] The segments of the arches simply abut each other, with three segments in the haunches and a solid top beam. The bridge is sheathed with lumber and topped with a flat roof, a roof common to the Iowa covered bridges. The bridge was completed in 1880 at a cost of $1180.

The first covered bridge in Madison County was built in 1868 by a local contractor, Eli Cox. Cox, with his sons, built several bridges in the county, which were constructed from timber sawn at his mill, and supported by local stone and mortar.[8] Four more covered bridges were built before county standards were established in 1870. A total of nineteen covered bridges were built in the county, six of which survive today. The bridges of H.P. Jones, who was the primary contractor in the late 1870s and early 80s, have several distinct characteristics, most notably the almost flat roof. This creates a tubular appearance, which

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[6]Jon Robison, "Covered Bridges of Madison County," Annals of Iowa, 38:6 (Fall 1966), 414.

[7]Hartsook, 25.

[8]H.A. Mueller, History of Madison County Iowa and Its People, (Chicago: The S.J. Clarke Publishing Company, 1915), 172.

is rarely found outside of Madison County.[9] George K. Foster, who worked on the Holliwell Bridge, served as county foreman for bridge construction for ten years.[10]

MADISON COUNTY

Madison County was first settled in 1846, as a group of men came up from Buchanan County in Missouri. An area of many streams and timber, it was an appealing destination for early settlers. After 1848, settlers began to stream in from Indiana, Ohio and states in the east.[11] During the next thirty years, the residents built an effective infrastructure, with a series of saw mills and grist mills, wagon roads, and bridges.[12] The Holliwell Bridge is located in rural Scott Township about four miles from Winterset, the county seat.

The bridges were not noted in the county as important landmarks until 1933. At that time, only ten covered bridges were left in the county. The Madison County Historical Society became involved, and Mrs. Fred Hartsook wrote a complete history which she presented to the County Board of Supervisors.[13] The issue was not resolved, however, until 1950 when the Board of Supervisors decided to preserve the remaining bridges.[14] In 1970, the first Covered Bridge Festival was organized, which became an annual event. The Chamber of Commerce has capitalized on interest in the covered bridges, providing maps, signs, and memorabilia for tourists. With the publication of The Bridges of Madison County, the amount of tourism accelerated and has received yet another boost from the film adaptation.

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[9]Richard S. Allen, Covered Bridges of the Middle West, (New York: Bonanza Books, 1972), 104.

[10]Mueller, Vol. II, 168-9.

[11]H. A. Mueller, History of Madison County, Iowa and its People, (Chicago: The S.J. Clarke Publishing Company, 1915), 20, 144.

[12]Leslie Swanson, Covered Bridges in Illinois, Iowa and Wisconsin, rev. ed., (Moline, Illinois, 1986), 40.

[13]Mrs. Hartsook's history is now published in Scenic Madison County, Iowa, a pamphlet available at the Madison County Historical Society. It remains the most complete history of the bridges.

[14]Swanson, 41-2.

The Holliwell Bridge is an excellent representative of the covered bridge technology which predominated in Iowa before the widespread adoption of all-metal spans, and is the longest remaining timber span in the state. The Madison County bridges as a group offer the opportunity to see a standardized form of vernacular bridge building, and with their tourism value, are certain to be preserved. The Holliwell Bridge is scheduled for extensive renovation in the next year.

APPENDIX A

Chronology of Covered Bridges in Madison County

1868 - Brown Bridge (J.P. Clark), Callison (Eli Cox), and Cox Bridge (Eli Cox)
1869 - Backbone (Eli Cox) and Kellogg (Unknown)
1870 - Cutler-Donahue* (Eli Cox), Imes* (J.P. Clark), and McBride (J.P. Clark)
1871 - Dunmire Bridge (E.H. Conger)
1872 - Afton Bridge (Eli Cox) and Rhyno's Ford (L.W. Winkley)
1877 - Cooper's Ford (Eli Cox), King (J.P. Clark) and Roseman* (H.P. Jones)
1878 - Cottenwood Ford (Eli Cox)
1880 - Holliwell* (H.P. Jones and G.K. Foster)
1883 - Cedar* (H.P. Jones)
1884 - Hogback* (H.P. Jones)
Unknown date - Klingensmith-Bennett (H.P. Jones)

(Asterisks indicate surviving bridges)

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ADDENDUM TO
HOLLIWELL BRIDGE
Iowa Historic Bridges Recording Project
Spanning Middle River at County Road
Winterset vic.
Madison County
Iowa

HAER No. IA-64

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HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
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HOLLIWELL BRIDGE

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This appendix is an addendum to a 7-page report previously transmitted to the Library of Congress.

APPENDIX: ADDITIONAL REFERENCES

Interested readers may consult the Historical Overview of Iowa Bridges, HAER No. IA-88: "This historical overview of bridges in Iowa was prepared as part of Iowa Historic Bridges Recording Project - I and II, conducted during the summers of 1995 and 1996 by the Historic American Engineering Record (HAER). The purpose of the overview was to provide a unified historical context for the bridges involved in the recording projects."

ADDENDUM TO:
HOLLIWELL BRIDGE
Spanning Middle River at Holliwell Bridge Road (now bypassed)
(changed from Spanning Middle River at county road)
Winterset vicinity
Madison County
Iowa

HAER IA-64
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HISTORIC AMERICAN ENGINEERING RECORD

HOLLIWELL BRIDGE

This report is an addendum to a 7-page report and a 1-page report previously transmitted to the Library of Congress.

LOCATION:	Spanning Middle River at Holliwell Bridge Road (now bypassed), Winterset vicinity, Madison County, Iowa UTM: 15.419687.4575051, Patterson, Iowa Quadrangle
STRUCTURAL TYPE:	Town lattice through truss covered bridge
DATE OF CONSTRUCTION:	1880
BUILDER:	Harvey P. Jones and George K. Foster
OWNER:	Madison County, Iowa
PREVIOUS USE:	Vehicular bridge
PRESENT USE:	Historic landmark and tourist attraction
SIGNIFICANCE:	Holliwell Bridge is one of nineteen covered bridges built in Madison County, Iowa, in the late nineteenth century, and the longest of five that survive.
HISTORIAN:	Researched and written by Lola Bennett, Summer 2002; updated January 2005
PROJECT INFORMATION:	The National Covered Bridges Recording Project is part of the Historic American Engineering Record (HAER), a long-range program to document historically significant engineering and industrial works in the United States. HAER is administered by the Historic American Buildings Survey/Historic American Engineering Record, a division of the National Park Service, U.S. Department of the Interior. The Federal Highway Administration funded the project.

RELATED DOCUMENTATION: HAER No. IA-92, Cutler Bridge; HAER No. IA-93, Hogback Bridge; HAER No. IA-94, Imes Bridge; HAER No. IA-95, Roseman Bridge

Chronology

1805 America's first covered bridge built at Philadelphia.

1820 Ithiel Town patents the Town Lattice truss.

1844 G.B. Clark erects Iowa's first covered bridge at Fort Des Moines.

1846 Iowa becomes the twenty-ninth state admitted to the Union.

1849 Madison County established.

1855 First bridge erected at this site.

1868 Eli Cox builds Madison County's first covered bridge near his farm.

1870 Madison County adopts Town Lattice plan for bridges.

1872 Madison County's first iron bridge erected at Compton's Mill.

1876 First bridge at this site destroyed in a flood.

1880 Holliwell Bridge completed.[1]

1884 Madison County stops building covered bridges.

1933 Madison County Historical Society begins campaign to save covered bridges.

1950 Madison County Board of Supervisors agrees to preserve covered bridges.

1970 Madison County Covered Bridge Festival organized.

1976 Holliwell Bridge listed on the National Register of Historic Places.

1977 Bottom chord, floor beams and approaches rebuilt, $41,348.

1980 Roof rebuilt, $12,292.

1986 Holliwell Bridge bypassed.

1994 Madison County Covered Bridge Preservation Association formed.

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[1] The bridge gets its name from the Holliwell (also Hollowell and Halliwell) family who owned the adjacent property in the mid- to late-nineteenth century. G.W. Holliwell was listed as a farmer in the 1869 Madison County business directory, and his name appears near the bridge on 1891-92 county plat maps.

1995 Holliwell Bridge rehabilitated, $225,000.

2002 Holliwell Bridge recorded by the Historic American Engineering Record

Introduction

Between 1868 and 1884, Madison County erected nineteen wooden covered bridges. Over time, all but five of these structures were lost to floods, fires, progress or willful destruction. In 1933, the Madison County Historical Society began campaigning to preserve the county's ten surviving covered bridges, but they faced strong opposition from progress-minded citizens and local farmers, who desired modern open spans. Controversy continued for nearly two decades, and during that time, several more covered bridges were lost.

In 1950, the Madison County Board of Supervisors finally agreed to maintain the county's seven surviving covered bridges as tourist attractions. One by one, the bridges were moved or bypassed over the next three decades, but the county upheld its commitment to preserve them. In 1970, the county held the first annual Madison County Covered Bridge Festival, a time-honored event that now draws thousands of visitors each year. Tourism increased dramatically in the 1990s following the publication and subsequent movie adaptation of Robert James Waller's novel, *The Bridges of Madison County*.

Unfortunately, the covered bridges are still threatened by vandalism and arson. McBride Bridge was burned in 1983, Cedar Bridge was burned in 2002 (a replica of the original bridge was built from the original plans using authentic materials and methods in 2004), and there were subsequent arson attempts on Hogback and Roseman bridges. In cooperation with the Coalition for Advanced Wood Structures (USDA Forest Service Forest Products Laboratory and Iowa State University Bridge Engineering Center), Madison County is currently testing a remote-monitoring system to identify and mitigate potentially destructive activities at covered bridges. The ultimate goal is to develop tools for long-term preservation of historic timber bridges across the country.[2]

Description

Holliwell Bridge is a single-span Town lattice covered bridge on iron cylinder piers.[3] The total length of the bridge is 122' along the lower chord, the clear span measuring 110'. There is a timber stringer approach at each end: 49' long on the northwest end and 14' long on the southeast end.

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[2] Coalition for Advanced Wood Structures, "Remote Monitoring of Historic Covered Timber Bridges in Madison County for the Prevention of Arson and Vandalism," *Research in Progress*, 2003.

[3] Iron tubular piers were used in many parts of the country, particularly in areas that are likely to have unstable subsoil conditions. Early county bridges were built on timber piles or stone masonry abutments, but in 1884, the county began purchasing large quantities of tubular piers from nationally-known bridge fabricating companies. According to county records, Holliwell Bridge originally had timber pile piers.

The truss is framed in the manner patented by Ithiel Town in 1820. The upper and lower chords are composed of a pair of 2"x13" planks, spliced at irregular intervals along their length and fastened together with threaded bolts. There are secondary chords below the upper chord and above the lower chord, in the manner patented by Town in 1835. The upper and lower chords sandwich a lattice web of 2"x12" planks, two diamonds high. Bolts at each intersection fasten the web members together and to the upper and lower chords.

The lattice web is sandwiched between two arched queenpost trusses constructed of 6"x14" timbers. These arched trusses appear to be a modification of the traditional queenpost truss found in four of the five surviving Madison County covered bridges.[4] The ends of the queenpost divide in two, with one leg seated on the abutment, and the other leg seated on the cantilevered end of a bolster beam. Vertical 1½" diameter tie rods were added at an unknown date on either side of the auxiliary arched queenpost. A metal plate and nut assembly secure the rods at the upper side of the upper chord and the bottom side of the lower chord.

The floor system is comprised of 14" deep wooden floor beams (four planks bolted together) placed transversely and extending beyond the face of the bridge where they are attached by threaded iron rod sway braces to the upper portion of the trusses. The beams rest on the lower chords and the lower lateral bracing is fastened between them. Ten lines of stringers are laid on top of the floor beams and support the wood plank deck. The bedding timbers are on top of the concrete-filled iron tubular piers. Bolster beams are cantilevered from the piers to support the lower chord.

The upper lateral members are tie beams seated on the upper chord. These beams are built up in a thin lenticular shape, using two planks bowing respectively up and down with spacer blocks between them, to support the curve of the roof. No written documentation has been found regarding this unusual type of roof construction, but the cost of importing lumber by rail may have been a factor and presumably this type of construction was used to get maximum strength from the restricted sizes of lumber available to the builder.[5]

The roof is covered with rubber membrane fastened to wooden purlins. Cedar tongue-and-groove siding covers the exterior of the bridge to the eaves. The portals have arched openings and are angled forward over the approaches.

History

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[4] While many descriptions refer to this feature as an arch, it actually appears to be a modification of the traditional queenpost truss seen in the other Madison County covered bridges. The use of arched or diagonal members at each end indicates that the builder had some doubts about the load-carrying capacity of such a long span.

[5] Three of the five surviving Madison County covered bridges, built between 1880 and 1884, have a nearly flat roof, while the bridges built in 1870 and 1871 have a traditional gable roof. Recent authors have attributed the flat roof design of the Madison County covered bridges to H.P. Jones, but J.P. Clark's McBride Bridge (1871) also had this feature. Covered bridges with nearly flat roofs have also, on occasion, been built elsewhere. Howard Bridge at Rawsonville, Vermont, and County Farm Bridge near Dover, New Hampshire, were two examples.

This is the site of the first bridge in Madison County, built in the winter of 1854-55.[6] It was an uncovered timber pile bridge, 40' long, with an approach span at each end. That bridge washed away in a flood in 1876 and travelers resorted to fording the river for the next three years.

On September 3, 1879, the Madison County Board of Supervisors appropriated funds to build a new bridge "at Holliwell's Ford."[7] Construction began in October and continued through the winter months, under the supervision of county bridge foreman Harvey P. Jones. County records show payments to more than twenty individuals for labor on the bridge and to several companies and individuals for materials. Mrs. Holliwell was paid for boarding workers at the Holliwell farm. The bridge was completed in June 1880, at a cost of $1,180.

Holliwell Bridge carried traffic for over a century, until it was bypassed in 1986. The bridge was rehabilitated in 1995 and continues to serve the county as a local landmark and tourist attraction.

Builders

Eli Cox (1835-1885) emigrated from Ohio to Madison County, Iowa in 1856.[8] He built houses, barns, schools, churches and commercial buildings in and around Winterset, but he is probably best remembered for his bridges.[9] Cox began building bridges in 1864, but his early bridges were not covered. In 1868, he built Madison County's first covered bridge near his farm and subsequently built at least five other covered bridges in the county.[10]

Carpenter John P. Clark was another early covered bridge builder in Madison County. Clark began building covered bridges at about the same time as Eli Cox.[11] At least five covered bridges are attributed to him. County records indicate that in 1877-78, John Clark built bridges with local carpenters H.P. Jones and G.K. Foster.[12]

Harvey P. Jones (b. 1825) emigrated from Ohio to Madison County, Iowa, in 1845.[13] Jones was foreman of the county bridge crew from 1878 to 1886 and is considered the builder of record for

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[6] W.S. Wilkinson, as quoted in Hartsook, "Covered Bridges of Madison County, Iowa," *Covered Bridge Topics* 13 (Fall 1955).
[7] Madison County Board of Supervisors *Minutes*, Book C, p. 358.
[8] A.T. Andreas, *Illustrated Historical Atlas of the State of Iowa* (Chicago: Andreas Atlas Corp., 1875).
[9] Herman August Mueller, *The History of Madison County Iowa and its People* (Chicago: S.J. Clarke Publishing Co., 1915), p.173.
[10] According to W.H. Lewis, "Story of an Early Pioneer: Eli Cox, A Pioneer Builder in Madison County," *Winterset Madisonian* (Winterset, Iowa), 9 September 1926, Cox built at least seventeen covered bridges in Madison County and surrounding areas. This number could not be confirmed.
[11] Cheever, p.480.
[12] Clark, Jones and Foster worked together on the construction of Penn Bridge (an iron bridge) in 1877-78. Clark and Jones worked together on at least five small bridges in 1877. [Book C, p.104, 138, 170 and 204.]
[13] A.T. Andreas, *Illustrated Historical Atlas of the State of Iowa*, 1875. Jones is listed in the 1880 Federal Census as a carpenter.

at least fifteen bridges, both timber and iron spans.[14] Jones left Madison County sometime around 1890, when he sold his farm.

Jones's name often appears in county records in association with George K. Foster (1831-1886).[15] Born in Ohio in 1831, Foster lived in California before moving to Madison County in 1867. From 1877 until his death in 1886, Foster was in charge of the substructure work for bridges in Madison County.[16]

Madison County began building iron bridges in 1872, but continued to build both timber and iron bridges until 1884, when they switched to iron completely.[17] Around 1915, the county began building reinforced concrete bridges, a practice that still continues.

Design

Ithiel Town (1784-1844) was an architect from New Haven, Connecticut. He is remembered today for his role in developing the Greek Revival style of architecture, along with his partner, Alexander Jackson Davis. Town designed a number of churches, state capitols and other public buildings that still stand today. He also designed one of the most widely used wooden bridge trusses, for which he received patents in 1820 and 1835.

The Town truss was a lattice of sawn planks that eliminated the need for an arch or large hewn timbers. Rather than having notched joints, the lattice intersections were fastened with large wooden pegs, or trunnels (treenails). The truss functioned as a series of overlapping triangles, so that the load in any one triangle affected distribution of stress in all other triangles. The web members could handle both tension and compression and spread loads over a wide area.

Ithiel Town built only a few bridges himself, but used this same type of truss in the roofs of several important buildings he designed, and he received royalties of a dollar per foot of truss from bridge builders who used his patent. Town lattice truss bridges were built in large numbers in New England, New York and the South throughout the nineteenth century. Seeking Ithiel Town's own objective of "simple, permanent and economical" bridge design, in 1870, the Madison County Board of Supervisors issued a directive that all spans over 40' should be lattice truss covered bridges.[18] The local newspaper summarized their decision as follows:

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[14] The bridges of Madison County are often erroneously attributed to Benton Jones, who worked on county bridges from about 1887 until 1902. According to county records, Benton Jones repaired covered bridges, but there are no indications that he built them.

[15] The two men built at least five covered bridges, and worked on many other county bridges, between 1878 and 1886.

[16] G.K. Foster obituary, *Winterset Madisonian* (Winterset, Iowa), January 28, 1886, 4.

[17] King Bridge Company of Cleveland, Ohio, received many Madison County contracts for iron bridges in the 1870s and 1880s.

[18] Ithiel Town, *A Description of Ithiel Town's Improvement in the Construction of Wood and Iron Bridges* (New Haven: S. Converse, 1821).

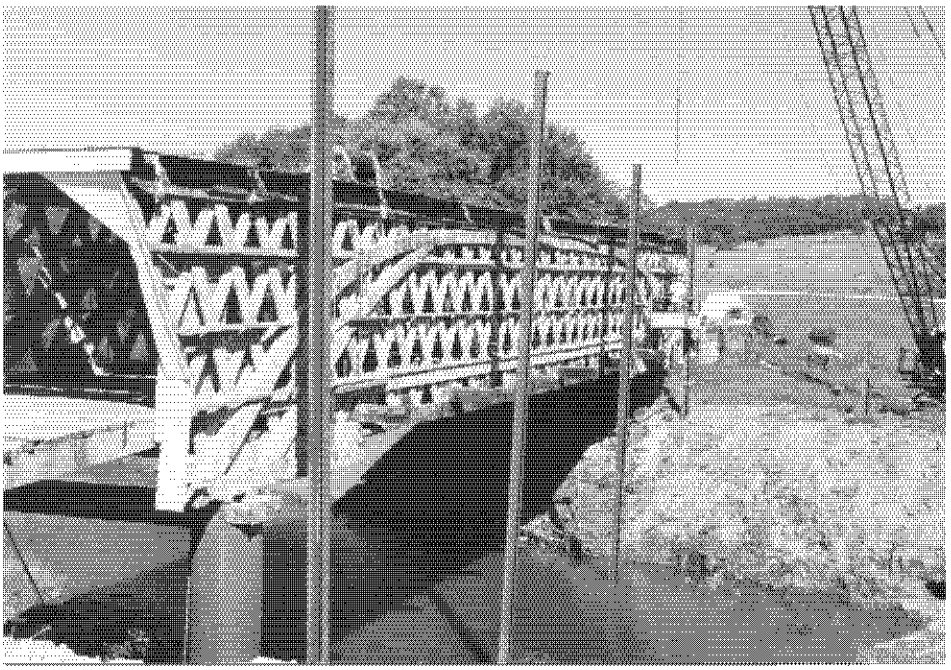
There has been much complaint about the erection of county bridges, as to their stability and make. The plan by the Board does away with the stone abutments, thus saving such expense and enabling the county to build a number more bridges. It is claimed that timber can be readily replaced, and that ice will affect it less than stone. They also require that bridges shall be covered. The expense of the roof is more than made up by the permanency of the bridge. Instead of the old style framing for the support of the bent, they have adopted the lattice work frame, like that used to support the ceiling of our court room.[19]

[19] *Winterset Madisonian* (Winterset, Iowa), 12 January 1870: 1.

Appendix A, Madison County Covered Bridges

	Cox	1868	Eli Cox		Replaced 1913
	Callison	1868	Eli Cox		
	Kellogg	1869			
	Brown (Walker/Fletcher)	1871	J.P. Clark	Town lattice truss; pitch roof	
WG #15-61-06	Imes (Wilkins Mill)	1871	J.P. Clark	Town lattice truss; pitch roof	Moved 1887, 1977
	Wiggins (McBride)	1871	J.P. Clark	Town lattice truss; flat roof	Burned 1983
WG #15-61-02	Cutler (Donahoe)	1871	Eli Cox	Town lattice truss; pitch roof	Moved 1970
	Rose (Dunmire)	1871		Town lattice truss; pitch roof	Replaced c1910
	Afton (Reed's Crossing)	1872	Eli Cox	Town lattice truss	Destroyed by ice 1895
	Rhyno's Ford	1872	S.W. Winkley	Town lattice truss	
	Klingensmith (Bennett)	c1875	J.P. Clark H.P. Jones	Town lattice truss; flat roof	Replaced 1934
	Coopers Ford	1877	Eli Cox	Town lattice truss	Destroyed by flood 1898
	Cottonwood Ford	1878	Eli Cox	Town lattice truss	
	Badger (Welch)	1878	J.P. Clark	Town lattice truss; pitch roof	Replaced late 1920s
	Backbone	1878	H.P. Jones G.K. Foster	Town lattice truss; flat roof	Burned 1914
WG #15-61-05	Holliwell	1880	H.P. Jones G.K. Foster	Town lattice truss; flat roof	Bypassed 1986 Rehabilitated 1997
WG #15-61-07	Roseman (Oak Grove)	1883	H.P. Jones G.K. Foster	Town lattice truss; flat roof	Bypassed 1981
	Cedar (Casper)	1883	H.P. Jones G.K. Foster	Town lattice truss; flat roof	Moved 1921; Bypassed 1964; Burned 2002
WG #15-61-04	Hogback	1884	H.P. Jones G.K. Foster	Town lattice truss; flat roof	Bypassed 1993

Appendix B, Photographs of 1995 Rehabilitation
All photographs are courtesy of Tim Waddingham.



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